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As a special case, if ever $x = 0$ formula (4) takes an indeterminate form which, however, is easily evaluated in the usual way to be (1), $k = (C - S)/n$, where periodic estimates are no longer needed and R_n is replaced by S . Likewise, if $k = 0$ formula (3) becomes $S = C(1 - x)^n$, where, again, periodic estimates are no longer needed and R_n is replaced by S . Solving this equation for x we obtain formula (2).

AN INTERESTING FOURTEENTH CENTURY TABLE.

By DAVID EUGENE SMITH, Columbia University.

There has recently come into the possession of the library of Columbia University an interesting mathematical roll written apparently in the south of Eng-

land about the close of the fourteenth century. It is $3\frac{3}{16}$ inches wide and $38\frac{3}{16}$ inches long and consists of two strips of parchment sewed together, only the first part of the roll being shown in the facsimile. The style of the script, the spelling, and the forms of the numerals suggest as the approximate date the year 1400. This is rather early for a mathematical manuscript in the English language, although we have others of still earlier date. English manuscripts of a mathematical nature written before the fifteenth century usually concern the interests of the less scholarly class, and, since this particular specimen relates to farm measurement, it would have been of little service had it appeared in the Latin of the church schools.

The roll consists of a table showing the widths corresponding to various lengths of a rectangular piece of land containing an acre. As the facsimile shows, the first column gives the lengths, beginning with 1 rod, the caption reading: "This is the lenght of the acre of londe." The lengths are given for every rod from 1 to 160.

This is the lenght of the acre of londe.	This is the half rod.	This is the quarter rod.	This is the pynche halfe and more
1	1	1	1
2	2	2	2
3	3	3	3
4	4	4	4
5	5	5	5
6	6	6	6
7	7	7	7
8	8	8	8
9	9	9	9
10	10	10	10
11	11	11	11
12	12	12	12
13	13	13	13
14	14	14	14
15	15	15	15
16	16	16	16
17	17	17	17
18	18	18	18
19	19	19	19
20	20	20	20
21	21	21	21
22	22	22	22
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26	26	26	26
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28	28	28	28
29	29	29	29
30	30	30	30
31	31	31	31
32	32	32	32
33	33	33	33
34	34	34	34
35	35	35	35
36	36	36	36
37	37	37	37
38	38	38	38
39	39	39	39
40	40	40	40
41	41	41	41
42	42	42	42
43	43	43	43
44	44	44	44
45	45	45	45
46	46	46	46
47	47	47	47
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49	49	49	49
50	50	50	50
51	51	51	51
52	52	52	52
53	53	53	53
54	54	54	54
55	55	55	55
56	56	56	56
57	57	57	57
58	58	58	58
59	59	59	59
60	60	60	60
61	61	61	61
62	62	62	62
63	63	63	63
64	64	64	64
65	65	65	65
66	66	66	66
67	67	67	67
68	68	68	68
69	69	69	69
70	70	70	70
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72	72	72	72
73	73	73	73
74	74	74	74
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92	92	92	92
93	93	93	93
94	94	94	94
95	95	95	95
96	96	96	96
97	97	97	97
98	98	98	98
99	99	99	99
100	100	100	100
101	101	101	101
102	102	102	102
103	103	103	103
104	104	104	104
105	105	105	105
106	106	106	106
107	107	107	107
108	108	108	108
109	109	109	109
110	110	110	110
111	111	111	111
112	112	112	112
113	113	113	113
114	114	114	114
115	115	115	115
116	116	116	116
117	117	117	117
118	118	118	118
119	119	119	119
120	120	120	120
121	121	121	121
122	122	122	122
123	123	123	123
124	124	124	124
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135	135	135	135
136	136	136	136
137	137	137	137
138	138	138	138
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140	140	140	140
141	141	141	141
142	142	142	142
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144	144	144	144
145	145	145	145
146	146	146	146
147	147	147	147
148	148	148	148
149	149	149	149
150	150	150	150
151	151	151	151
152	152	152	152
153	153	153	153
154	154	154	154
155	155	155	155
156	156	156	156
157	157	157	157
158	158	158	158
159	159	159	159
160	160	160	160

The second column gives the largest number of rods in the width of the rectangular piece: "This is the brede of y^e acre of londe in Roddis,"—in which the symbol y^e is, as is well known to scholars, the old Anglo-Saxon form of "the," the letter resembling a small y (*th*) having been retained (as in this manuscript) long after the form *Th* (for the capital) was adopted.

The third and fourth columns give the fractions of a rod in halves and fourths, "The halfe Rode" and "The quarter Rode" forming an interesting relic of the ancient use of those unit fractions which seem to have been first employed in Mesopotamia in the third millennium B.C. and which are familiar in Egyptian mathematics for a period of upwards of two thousand years.

Instead of then proceeding to eighths, which would have been a little too difficult for the farm owner, the maker of the table gives, in the next column, the number of feet, or, as he writes it, "The foote." The final column gives the inches and fractions,— "The ynche halfe and q^rter."

It will be observed that the numerals are Roman, the Hindu-Arabic forms not having as yet reached the great mass of commercial and industrial people in any country north of Italy, if, indeed, they may be said to have done so in Italy itself. The Roman numerals answered all ordinary needs so long as integers alone were involved, but they failed when elaborate fractions were demanded. This manuscript shows how the difficulty was met, both by the use of the unit fractions one half and one fourth with respect to the rod, as shown by the numerator 1 in the third and fourth columns, and with respect to the inch, as shown by the characters ($\sim$) for one half and ($\cdot$) for one fourth.

The need for such a table will become apparent if the reader will endeavor to find the width of a rectangle, say 12 rods long and containing precisely one acre, making use only of Roman numerals or the abacus in his computations. In this special case the table gives as the result 13 (xij) rods, $\frac{1}{4}$ rod, 1 foot, $4\frac{1}{2}$ (iiij $\sim$) inches, which the reader may care to verify. The computations are accurate to a fraction of an inch, but the only fractions used in this connection are $\frac{1}{2}$ ($\sim$), $\frac{1}{4}$ ($\cdot$), and $\frac{3}{4}$ ($\sim\cdot$), and in some of his results the computer has erred by more than a quarter of an inch,—an error of no practical significance in the kind of computation for which the table was intended.

RECENT PUBLICATIONS.

REVIEWS.

The Absolute Relations of Time and Space. By A. A. ROBB. Cambridge, at the University Press, 1921. 8vo. 9 + 80 pages. Price 5 shillings.

Preface: "At the meeting of the British Association in 1902, Lord Rayleigh gave a paper entitled 'Does motion through the ether cause double refraction?' in which he described some experiments which seemed to indicate that the answer was in the negative. I recollect that on this occasion Professor Larmor was asked whether he would expect any such effect and he replied that he did not expect any.